



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/DK96/00535 <b>(22) International Filing Date:</b> 16 December 1996 (16.12.96) <b>(30) Priority Data:</b> 14 June 98 / 30 mo 27 14/7/95 14 December 1995 (14.12.95) DK <b>(71) Applicant (for all designated States except US):</b> STRAND, Eilif [NO/NO]; Rugdeveien 25, N-3030 Drammen (NO). <b>(71)(72) Applicant and Inventor:</b> FRANKE, Kell, Erik [DK/DK]; Øster Søgade 10, DK-1357 Copenhagen K (DK). <b>(74) Agent:</b> HOFMAN-BANG & BOUTARD, LEHMANN & REE A/S; Hans Bekkevolds Allé 7, DK-2900 Hellerup (DK).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, VZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report. In English translation (filed in Danish).</i>

**(54) Title:** A TRANSFER FOR DECORATING TEXTILES WITH COLOURED PATTERNS**(57) Abstract**

A transfer capable of applying one- or multi-coloured patterns to textiles under heat and pressure comprises a carrier sheet (1) having a non-binding surface which carries (a) a one- or multi-coloured pattern (5) printed on the carrier sheet using a digitally controlled colour printer; (b) a transparent (6) or white-pigmented (7) elastomer layer of a polymer having a high plasticizing point printed configuratively on the pattern (5); and (c) a heat-activatable thermoplastic polymeric glue layer (8) printed configuratively on the transparent (6) or white-pigmented (7) elastomer layer or a heat-activatable hot melt granulate sprinkled on the elastomer layer while said layer was still wet. An even better encapsulation of the coloured pattern is obtained when the carrier sheet has printed thereon a first transparent elastomer layer of a polymer having a high plasticizing point, and the pattern is printed on this elastomer layer using a digitally controlled colour printer. Additional strength is obtained when both a transparent elastomer layer and a white-pigmented elastomer layer are printed on top of the coloured pattern.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 96/00535

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: D06P 7/00, D06Q 1/12, B44C 1/16  
According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: D06P, D06Q, B44C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EDOC, CAPLUS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4773953 A (DONALD S. HARE), 27 Sept 1988 (27.09.88) --	1-26
A	WO 9207990 A1 (REFLEX PROMOTION INTERNATIONAL A/S), 14 May 1992 (14.05.92) --	1-26
A	WO 8601097 A1 (AVERY INTERNATIONAL CORPORATION), 27 February 1986 (27.02.86) -- -----	1-26

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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US-A- 4773953	27/09/88	CA-A- 1321106	10/08/93
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A transfer capable of applying one- or multi-coloured patterns to textiles under heat and pressure comprises a carrier sheet (1) having a non-binding surface which carries (a) a one- or multi-coloured pattern (5) printed on the carrier sheet using a digitally controlled colour printer; (b) a transparent (6) or white-pigmented (7) elastomer layer of a polymer having a high plasticizing point printed configuratively on the pattern (5); and (c) a heat-activatable thermoplastic polymeric glue layer (8) printed configuratively on the transparent (6) or white-pigmented (7) elastomer layer or a heat-activatable hot melt granulate sprinkled on the elastomer layer while said layer was still wet. An even better encapsulation of the coloured pattern is obtained when the carrier sheet has printed thereon a first transparent elastomer layer of a polymer having a high plasticizing point, and the pattern is printed on this elastomer layer using a digitally controlled colour printer. Additional strength is obtained when both a transparent elastomer layer and a white-pigmented elastomer layer are printed on top of the coloured pattern.

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## A transfer for decorating textiles with coloured patterns

The invention relates to a heat application transfer for decorating textiles with coloured patterns having a particularly high washing and cleaning fastness, wherein the design is produced by means of a digitally controlled colour printer.

### BACKGROUND OF THE INVENTION

The most common way of making transfers for the application on textiles is by means of silk screen printing where each individual colour is applied to a sheet of silicone paper. Some colours, such as vinyl and plastisol colours, are heat-activatable, but are then not very fast without further treatment. To improve the fastness, the colours are usually provided with a hot melt granulate layer in the form of a powder or a fine-grained granulate mixed in an extender base, which is applied to the colours and serves as a special glue layer between textile and colours, thereby considerably improving the fastness. At high temperatures, however, e.g. during tumbling processes which use temperatures up to 140 °C in certain cases, they will get loose from the textile or a possible glue layer. Solvent-based two-component colours will be more stable against the action of temperature, but, when having been subjected to industrial washing and tumbling for an extended period of time, they will dry out and peel off from the textile.

The international patent application WO 92/07990 discloses a possible use of a colour copier with a two-component colour toner system in the making of a transfer for textiles. Such a two-component colour toner system, however, is not known in the market for colour copiers today. The present laser colour copiers use colour toners

of a one-component thermoplastic resin type where no polymerization takes place. Furthermore, the system described in the above-mentioned international application depends on a colourless two-component extender base layer  
5 which is applied on top of the coloured image and, immediately when wet, is coated with a thermoplastic granulate which serves as a glue layer. This embodiment, however, can only be applied to white textiles, and the transferred image will only be sharp on very smooth tex-  
10 tiles.

It is prior art to use colour copiers for the transfer of images to a thermoplastics-coated transfer paper from which it can be transferred by heat and pressure to white  
15 cotton textiles. The known products, however, exhibit great washing and cleaning weaknesses and thus just stand washing at about 40 °C for a limited number of times. The reason is primarily that the colour toners are relatively unprotected against mechanical impacts, and that they re-  
20 main heat-activatable already at temperatures from about 90 °C. Further, printing is only possible on white textiles, and only on textiles where the predominant part consists of cotton. If it is desired to transfer colour images of this type to dark textiles, up to several addi-  
25 tional operations are required for the lamination and adaptation of a white cover layer below the colour toners. This process is both expensive and time-consuming, and it is moreover not possible to make configurative patterns, but only complete cover faces.

30

#### OBJECT OF THE INVENTION

A number of data-controlled colour printers of various types are available which reproduce four-coloured raster  
35 images with a resolution of 400 dpi or more with an almost photographic appearance. It is not possible in a



pure silk screen printing process to achieve a resolution of more than 100 dpi, and consequently fine details are lost in the reproduction. Accordingly, it would be a great advantage to be able to use such colour printers for the making of coloured and particularly multi-coloured configurative transfers for the textile industry. Of course, it would also be an advantage to be able to use data programs for the editing of images and designs together with scanners, which transfer original images to data.

The object of the invention is to make a coloured configurative transfer for the textile industry which combines the great advantages achieved by the use of an electronic colour printer as the graphic unit with particularly great washing and cleaning fastness.

#### SUMMARY OF THE INVENTION

Since colour images generated from ordinary printers to a transfer substrate cannot readily be transferred to a textile in a configurative pattern, this is achieved according to the invention by using silk screen printing processes for making a protective layer and/or cover layer as well as a glue layer in accordance with the invention.

In its most simple embodiment the transfer of the invention is unique in that it comprises a carrier sheet having a non-binding surface which carries

- (a) a one- or multi-coloured pattern printed on the carrier sheet using a digitally controlled colour printer;
- (b) a transparent or white-pigmented elastomer layer of a polymer having a high plasticizing point printed configuratively on the pattern; and

- (c) a heat-activatable thermoplastic polymeric glue layer printed configuratively on the transparent or white-pigmented elastomer layer, or a heat-activatable hot melt granulate sprinkled on the elastomer layer while this was still wet.

It has surprisingly been found according to the invention that the colour toners which are usually used in multi-colour copiers and which may e.g. be based on thermoplastic polyol resins, migrate into the surface of the applied transparent or white-pigmented elastomer layer and harden together with said layer under the action of the isocyanate hardener contained in the elastomer layer. The colour toners hereby lose their thermoplastic nature and remain adhered to the elastomer layer, so that the coloured pattern or the image, after the transfer has been applied to a textile, stands washing, also at elevated temperatures.

If it is desired to encapsulate the coloured pattern or image so that it will be additionally resistant to wear and to the action of washing and cleaning, it may be provided with an additional protective layer. In this embodiment the transfer of the invention is unique in that it comprises a carrier sheet having a non-binding surface which carries

- (a) a first transparent elastomer layer of a polymer having a high plasticizing point printed configuratively on the carrier sheet;
- (b) a one- or multi-coloured pattern printed on the first elastomer layer using a digitally controlled colour printer;
- (c) a second transparent or white-pigmented elastomer layer of a polymer having a high plasticizing point printed configuratively on the pattern; and

- (d) a heat-activatable thermoplastic polymeric glue layer printed configuratively on the transparent or white-pigmented elastomer layer, or a heat-activatable hot melt granulate sprinkled on the elastomer layer while this was still wet.

Further, if the transfer is intended to be applied to very coarse or uneven textiles, and if it is desired to maintain fine details in the coloured pattern or image, the transfer may be provided with both a white-pigmented and a transparent elastomer layer (c); in this case the very strongest encapsulation of the coloured pattern or image is achieved when first a transparent elastomer layer and then a white-pigmented elastomer layer are applied.

In the latter embodiment the transfer of the invention is unique in that it comprises a carrier sheet having a non-binding surface which carries

- (a) a first transparent elastomer layer of a polymer having a high plasticizing point printed configuratively on the carrier sheet;
- (b) a one- or multi-coloured pattern printed on the elastomer layer using a digitally controlled colour printer;
- (c) a second transparent elastomer layer of a polymer having a high plasticizing point printed configuratively on the pattern;
- (d) a white-pigmented elastomer layer of a polymer having a high plasticizing point printed configuratively on the second transparent elastomer layer; and
- (e) a heat-activatable thermoplastic polymeric glue layer printed configuratively on the white-pigmented elastomer layer, or a heat-activatable hot melt

granulate sprinkled on the elastomer' layer while this was still wet.

5 The carrier sheet having a non-binding surface may e.g. consist of paper or a heat-resistant plastics sheet, e.g. of polyester, coated with a thin layer of silicone or polyolefin; or it may e.g. consist of a polyolefin sheet, expediently a sheet of high density (HD) polypropylene.

10 The transparent elastomer layers may advantageously consist of an elastomeric polyurethane having a high plasticizing point applied in the form of a solution in an organic solvent. This is particularly advantageous in connection with the use of colour copiers of the dry electrostatic type which normally apply a thin silicone oil  
15 to the surface of the fixing rollers to prevent toner particles from sticking to the rollers. Small amounts of this silicone oil are applied to the colour toners in the printing and can be detrimental to the adhesion of the  
20 subsequent elastomer layer. But the organic solvent in the polyurethane layer dissolves the silicone film so that the polyurethane and the toners combine to form a homogeneous unit.

25 However, with other types of colour printers, or if other steps are taken to avoid the silicone film, it is also possible to use corresponding polyurethanes in aqueous solution.

30 The white elastomer layer, which may optionally be omitted if the transfer is to be used for applying a pattern to white textiles, may advantageously consist of the same type of polyurethane as above, pigmented with a white inorganic pigment and applied from an organic or aqueous  
35 solution.

The final glue layer may advantageously consist of polyurethane thermoplastics having a plasticizing point in the range 120-160 °C containing dispersed fine particles of a hot melt of copolyamide or high density polyethylene type having a melting point of 100-140 °C in the ratio 1:1, applied in the form of an organic or aqueous solution of the polyurethane with dispersed hot melt powder.

A special variation of the glue layer comprises laminating a thermoplastic moulded polyurethane sheet on the transparent or white elastomer layer. A 100 µm thick transparent or coloured aromatic polyester film having a plasticizing point of about 160 °C, a hardness of 93° Shore and an elasticity of 400% is particularly useful for the purpose. The silk screen printed polyurethane layers and the polyurethane sheet can be laminated together at 160 °C under slight pressure, so that the sheet does not melt, but only adheres to the applied layer. During application of the finished transfer to a textile, which takes place at 200 °C and 320 kPa in 12 seconds, the polyurethane sheet melts and forms a very strong glue layer between the textile and printed image.

In an advantageous embodiment of the invention, the transparent elastomer layers, the white elastomer layer and the glue layer are printed on the carrier sheet by silk screen printing processes in the same register and configuration on top of one another. Owing to possible inaccuracies in the register, however, the glue layer normally protrudes 1-2 mm beyond the configuration of the other layers in practice.

As stated, the one- or multi-coloured pattern is printed on the first elastomer layer using a digitally controlled colour printer. The invention is very flexible with respect to the selection of colour printer. A rough dis-

inction may be made between digitally controlled colour printers which work with powder toners, liquid dyes or colour ribbons.

- 5 Accordingly, the coloured pattern in a transfer of the invention will normally be printed on the first transparent elastomer layer by means of a dry electrostatic colour toner printer, an ink jet printer with liquid dye or a thermotransfer colour printer, all of which are digi-  
10 tally controlled.

The invention also comprises a method of making a transfer as described above, said method being unique by, on a carrier sheet having a non-binding surface,

- 15 (a) printing a one- or multi-coloured pattern using a digitally controlled colour printer;  
(b) on top of the pattern, configuratively printing a transparent or white-pigmented elastomer layer of a polymer having a high plasticizing point; and  
20 (c) on top of the transparent or white-pigmented elastomer layer, printing a heat-activatable thermoplastic polymeric glue layer, or, while the elastomer layer is still wet, sprinkling a heat-activatable hot melt granulate on said layer.

25

Another embodiment of the method of the invention is unique by, on a carrier sheet (1) having a non-binding surface,

- (a) configuratively printing a first transparent elastomer layer (4) of a polymer having a high plasticizing point;  
30 (b) on top of the first elastomer layer (4), printing a one- or multi-coloured pattern (5) using a digitally controlled colour printer;  
35 (c) on top of the pattern (5), configuratively printing a second transparent (6) or white-pigmented (7) elas-

tomers layer of a polymer having a high plasticizing point; and

- (d) on top of the transparent (6) or white-pigmented (7) elastomer layer, configuratively printing a heat-activatable thermoplastic polymeric glue layer (8), or, while the elastomer layer is still wet, sprinkling a heat-activatable hot melt granulate on said layer.

10 Another embodiment of the method of the invention is unique by, on a carrier sheet having a non-binding surface,

- (a) configuratively printing a first transparent elastomer layer of a polymer having a high plasticizing point;

- (b) on top of the first elastomer layer, printing a one- or multi-coloured pattern using a digitally controlled colour printer;

- (c) on top of the pattern, configuratively printing a second transparent elastomer layer of a polymer having a high plasticizing point;

- (d) on top of the second elastomer layer, configuratively printing a white-pigmented elastomer layer of a polymer having a high plasticizing point; and

- (e) on top of the white-pigmented elastomer layer, configuratively printing a heat-activatable thermoplastic polymeric glue layer, or, while the elastomer layer is still wet, sprinkling a heat-activatable hot melt granulate on said layer.

In accordance with the disclosure above, the transparent elastomer layers are advantageously applied in the form of an organic solution of an elastomer polyurethane having a high plasticizing point; but it may also take place in the form of an aqueous solution.

The white elastomer layer may then be applied in the form of a corresponding organic or aqueous polyurethane solution which is pigmented with a white pigment.

5 Furthermore, the glue layer may advantageously be applied in the form of an organic or aqueous solution of polyurethane thermoplastics having a plasticizing point in the range 120-160 °C, in which a fine hot melt powder of copolyamide or high density polyethylene type having a  
10 melting point of 100-140 °C is dispersed in the ratio 1:1.

In an advantageous embodiment of the method of the invention, the transparent elastomer layers, the white elastomer layer and the glue layer are printed on the carrier  
15 sheet by silk screen printing processes in the same register and configuration on top of one another. But, as mentioned before, owing to possible inaccuracies in the register, the glue layer will normally be printed in a  
20 configuration which protrudes 1-2 mm beyond the configuration of the other layers.

Furthermore, the coloured pattern is generally printed on the first transparent elastomer layer by means of a dry  
25 electrostatic colour toner printer, an ink jet printer with liquid dye or a thermotransfer colour printer, all of which are digitally controlled.

According to the invention, if the transfer is to be used  
30 for applying a pattern to white textiles, it is possible to omit the white elastomer layer and to print the glue layer directly on the second transparent elastomer layer.

According to the invention, if the transfer is to be used  
35 for applying a pattern to textiles having a very even and non-textured surface, it is also possible to omit the



second transparent elastomer layer and to print the white elastomer layer directly on the one- or multi-coloured pattern.

5 Finally, according to the invention, it is also possible to omit the glue layer and, where application to white textiles is involved, optionally also the white elastomer layer, in which case the surface of the white elastomer layer and the second transparent elastomer layer, respec-  
10 tively, are modified to be heat-activatable. This is done most expediently according to the invention in that immediately after the printing of the elastomer layer, while this is still wet, a fine hot melt powder of copolyamide or high density polyethylene type having a melting point  
15 of 100-140 °C is sprinkled on the surface.

The invention also comprises textile products on which a one- or multi-coloured pattern is attached by application from a transfer of the invention.

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The method and the transfer of the invention give evident cost-saving advantages particularly in case of a low number of printed copies.

## 25 DETAILED DESCRIPTION OF THE INVENTION

The invention will be illustrated more fully by the following detailed description of various embodiments of it with reference to the drawing, which schematically shows  
30 the structure of a transfer of the invention.

The drawing shows a carrier sheet (1) composed of a sheet of paper or a heat-resistant plastics sheet (2) coated with a thin release layer of silicone or polyolefin (3).  
35 A first transparent elastomer layer (4) is configuratively printed by silk screen printing on the silicone or

polyolefin surface, and, on top of said elastomer layer, a one- or multi-coloured pattern (5) is printed with a digitally controlled colour printer. On top of the coloured pattern, a second transparent elastomer layer (6) is configuratively printed, again by silk screen printing, and, in the same manner, a white-pigmented elastomer layer is printed on said second elastomer layer. Uppermost, a heat-activatable thermoplastic polymeric glue layer (8) is printed in the same manner.

10

A thin transparent elastomer layer (4), e.g. an organic solution of an elastomeric polyurethane having a high plasticizing point, is applied by silk screen printing with a 34T blanket in a desired configuration on a carrier sheet (1) having a non-binding surface, e.g. of paper or heat-resistant plastics sheet (2) coated with silicone or polyolefin (3) or entirely of polyolefin, e.g. HD polypropylene. This first elastomer layer (4) is then dried in an infrared/hot air drying tunnel at about 70-80 °C.

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The desired pattern (5) is now printed in mirror-inverted fashion on the carrier sheet (1) with applied elastomer layer (4) within the elastomer-coated area by means of a colour printer, e.g. a four-colour copier of the "Ricoh NC5006" type, which works with a dual powder toner system and a resolution of 400 dpi. After the print has been fixed in the heat section of the machine, the toners, which consist of thermoplastics, are still heat-activatable even at relatively low temperatures (about 90 °C). To stabilize the toners so that they can later stand higher temperatures, a second transparent elastomer layer (6) is printed on top of the colour toners, e.g. of the same polyurethane solution as the elastomer layer (4). The solvent of the polyurethane layer neutralizes the silicone film, which is applied to the toners during the

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heat fixation in the colour copier, and the polymer/isocyanate mixture combines with the toners to form a homogeneous unit which hardens at room temperature by means of the atmospheric humidity. A well protected colour layer has now been provided between two polyurethane layers which are not heat-activatable at the application temperature of the transfer.

Since the covering power of the toners is none too good on others than white textiles, a white-pigmented elastomer layer (7), e.g. of a polyurethane with the same chemical composition as the preceding transparent layers and in the same configuration as the other layers, is now applied. A heat-activatable granulate of a polyamide-based hot melt, which serves as a glue layer between the transfer and the substrate, may now be applied to the elastomer layer (7) while it is still wet, or a heat-activatable thermoplastic polymeric glue layer (8), e.g. consisting of heat-activatable polyurethane thermoplastics mixed with a fine hot melt powder of copolyamide in the ratio 1:1, is applied to the white cover layer (7).

The transfer may now be applied to all ordinary textiles in the usual manner at 170-180 °C in 8-12 seconds and a pressure of about 310 kPa.

With respect to useful colour printers, a rough distinction may be made between digitally controlled colour printers working with powder toners, liquid dyes or colour ribbons. Examples of colour copiers using powder toners in a dry electrostatic process, include: "Canon® CLC 700", "Ricoh® NC 5006", and "Rank Xerox® 5775". Examples of digitally controlled colour printers using liquid dyes include: "Indigo Eprint 1000", "IBM Color Jetprinter PS 4079" and "Canon® BJC-880". Finally, examples of digitally controlled so-called thermotransfer colour printers

working with colour ribbons include: "ABDICK", "Seiko® ColorPoint 2 PSF-14" and "Fargo Pictura 310".

Each system has its cost/quality parameters between which  
5 one may choose freely. The elastomer layers encapsulating  
the colour layer may be adapted to the various printers  
e.g. by means of surface-active additives or electronic  
surface treatment. This applies to both water-based and  
solvent-based polymers. If, however, liquid dyes are  
10 used, waterproof dyes will always be preferred.

Modern digitally controlled colour printers are compati-  
ble with a number of standard software editing programs,  
e.g. Windows 3.X, IBM OS/2, Apple System 6 and 7 as well  
15 as the more advanced Adobe Postscript Level 2.

Preferred polymers having a high plasticizing point for  
making the elastomer layers (4), (6) and (7) are elas-  
tomeric polyurethanes, such as a one-component fully re-  
20 acted linear polyurethane on the basis of polyester and  
aliphatic diisocyanate or a one-component fully reacted  
polyurethane on the basis of polyester and aromatic di-  
isocyanate. The thermoplastic polymer for use in the glue  
layer (8) is preferably a corresponding polyurethane ad-  
25 justed to have a lower plasticizing point and thus to be  
heat-activatable together with the hot melt powder.

Examples of other useful elastomer systems include two-  
component polyurethane textile colours e.g. "Bargoscreen  
30 S18/50" from the company Aaberg or "Marafloor TK" from the  
company Marabu. These colour systems consist of 1-  
methoxy-2-propyl acetate and 3-methoxy-n-butyl acetate to  
which polyurethane binders are added. Diisocyanate is  
used as a binder. The recommended diluents for these sys-  
35 tems - cyclohexanone or ethyl glycol acetate - are rela-  
tively aggressive against the toners in the image layer

and must therefore be added in as small amounts as possible, while the carrier sheet should be treated carefully without greater mechanical impacts until the elastomer layer on the toners has dried.

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It should be stressed that, in addition to said polyurethane components, a large number of other thermoplastic resins may also be used, such as e.g. polyolefins, ethylene vinyl acetate copolymers, ethylene ethyl acrylate copolymers, ethylene acrylic acid copolymers, ionomers, polyesters, polyamides, acrylic resins, etc.

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When using elastomer systems which are water-dispersed and therefore do not contain solvents, washing may give rise to separation problems between the toner layer and the subsequently applied transparent layer. The reason is that colour copiers of the dry electrostatic type normally use a thin silicone oil on the surface of the fixing rollers which prevents toner particles from sticking to the rollers. It is inevitable that small amounts of silicone oil are left on the surface of the colour toners and cause separation or formation of air pockets between the toner layer and the subsequently applied polyurethane layer, particularly during washing. If it is desired to use a water-based colour/lacquer system, the problem may be solved by using infrared heat fixing of the toners alone, or ceramic fixing rollers, or other rollers which do not require silicone oil.

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30 Preferred method of preparation:

As will appear from the drawing, several successive polymer and image layers, which form the finished transfer, are printed individually on a carrier sheet (1) normally consisting of a sheet of paper of about 105 g/m<sup>2</sup> (2) coated with a release layer of silicone (3).

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First a transparent elastomer layer (4) is printed, preferably consisting of a polyurethane having the highest possible melting point, which following transfer to the substrate forms a protective top layer. Particularly useful was a 25% solution in propylene glycol methyl ether of a linear fully reacted polyurethane on the basis of polyester and aliphatic diisocyanate having a plasticizing point of 195-205 °C.

Then the desired image (5) is printed in a dry electrostatic colour copier. A particularly suitable colour copier is a "Ricoh NC5006" which produces colour copies with a resolution of 400 dpi with 256 shades per point. In other colour copiers, the copying paper runs about a drum, and this restricts the selection of copying materials. NC5006 therefore uses a transfer belt for transferring the original image to the copying sheet. The straight paper movement allows copying on different types of paper and transparencies.

A transparent elastomer layer (6) is now printed, said layer combining with the toners and consisting of the same composition as the first elastomer layer (4). The toners are now well protected between the two elastomer layers. Then, a white cover layer (7) is printed, consisting of the same polyurethane type as the first and second transparent elastomer layers, but pigmented with organic or inorganic colour pigments, e.g. titanium dioxide.

Finally, a glue layer (8) connecting the transfer (3) with the textile is printed. The glue layer consists of a mixture of a polyurethane which is a more softly adjusted one-component polyurethane having a melting point of 150-160 °C, and a hot melt powder on copolyamide basis in the

ratio 1:1. The melting point of the hot melt powder is about 115-130 °C, and the grain size is not above 80 µm. A particularly suitable hot melt powder has been found to be a copolyamide on the basis of polymerized, predominantly dimerized fatty acids or their esters and substantially aliphatic diamines. These hot melts possess great resistance to washing and cleaning agents, even at high temperatures (80-90 °C).

10 The one-component polyurethane glue primarily serves as a filler for the powdered hot melt, but also serves per se as thermoplastics. For example, a 35% solution in dimethyl formamide/toluene/methyl ethyl ketone of a one-component polyurethane glue on the basis of polyester and aromatic diisocyanate having a plasticizing point of 150-160 °C is particularly useful for the purpose.

The glue layer serves as a purely reversible thermoplastic, i.e. no hardening or cross-linking takes place in the application of the transfer to the textile by means of heat and pressure. Under the action of heat and pressure in the application to the textile, both the hot melt and the one-component polyurethane melt and are pressed down between the textile fibres and thereby anchor the transfer mechanically.

#### EXAMPLE 1

A four-coloured pattern or image (5) of a two-component toner having a particle size of 6.4 µm was applied directly to the non-binding surface of a carrier sheet (1) in a Ricoh NC 5006 colour copier. Subsequently, a white-pigmented two-component polyurethane elastomer sheet (7) was applied on top of the toner image by silk screen printing. The two-component elastomer used was "Bargoscreen S18/50" polyurethane textile colour from Aa-

berg Druckfarben, Aaberg, Switzerland, admixed with 10% polydiisocyanate hardener. It is essential to the durability of the transfer that the toner resin has an extremely good contact with the white two-component polyurethane elastomer, so that common polymerization of the two materials takes place. As the heat fixing unit in the copier uses dimethyl polysiloxane silicone oil as a release agent on the heat rollers, small amounts of it will be transferred to the surface of the toner layer and thereby reduce the surface tension. It was therefore necessary to add a small amount of a wetting agent to the white-pigmented polyurethane elastomer to increase its wetting capacity, and 0.5% wetting agent of the brand "BYK 358" from BYK-Chemie GmbH, Wessel, Germany was added. The carrier sheet was fed through a tunnel drying oven in 105 °C hot air to dry the white layer before further processing. Then a transparent two-component polyurethane layer from the same series, "Bargoscreen S18/50", as the white layer was applied by silk screen printing, and while it was still wet, a layer of hot melt copolyamide granulate of the brand "Kiwomelt 2095 F" from Kissel & Wolf GmbH, Wiesloch, Germany, was added, forming the glue layer. The finished transfer was applied to a cotton/polyester textile at 165 °C at a pressure of 310 kPa in 10 seconds. This type of transfer is very versatile and is suitable for most types of textiles.

## EXAMPLE 2

A transparent elastomer layer (4) of a linear one-component polyurethane on the basis of polyester and aliphatic diisocyanate was applied in a desired configuration by silk screen printing with a 34T blanket on a carrier sheet (1) consisting of a 105 g/m<sup>2</sup> sheet of paper (2), coated with a release layer of silicone (3). Then the carrier sheet with the applied elastomer layer was



introduced into a Ricoh colour copier of the type NC5006, and a four-coloured pattern (5) of a two-component toner having a particle size of  $6.4\text{ }\mu\text{m}$  was transferred within the area of the elastomer layer (4). A transparent elastomer layer (6) on the basis of the said one-component polyester urethane with the same configuration as the first elastomer layer was printed on top of the toner layer. Further, a titanium dioxide-pigmented white polyurethane layer (7) of the same structure as the preceding layers was printed. Finally, a glue layer (8) was printed, consisting of a mixture of a 35% solution in dimethyl formamide/toluene/methyl ethyl ketone of a one-component polyurethane glue on the basis of polyester and aromatic diisocyanate having a plasticizing point of 150-160 °C and a non-dissolved hot melt powder based on copolyamide. In this example, the individual elastomer layers were adjusted relatively softly, viz. with an ultimate/tensile strength of about 700-800%. Between the printing of the individual layers, elastomer layer, white cover layer and glue layer, these are dried in a hot air/infrared drying oven at 70-80 °C, and the transfer is then dry, while the final hardening is completed only after about 10 hours at room temperature or 3-4 hours in a heating cabinet at 60 °C. The finished transfer was transferred to a cotton/polyester textile at 180 °C and a pressure of 310 kPa in 10 seconds. This type of transfer is particularly suitable for textured elastic textiles.

### EXAMPLE 3

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Like in the preceding example, an elastomer layer (4), a toner layer (5), an elastomer layer (6), a white cover layer (7) and finally a glue layer (8) were printed successively on a carrier sheet (1) in the described manner. This time a polyurethane with a somewhat harder setting was used, viz. with an ultimate/tensile strength of 100-

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200%. The powdered hot melt was also the 'same' as mentioned above. The transfer is applied to the textile in the same manner as in example 1. Such a setting is suitable particularly for non-elastic woven textiles for work  
5 clothes.

Conclusively, the described transfer material, according to the field of use, may be adapted for various textiles, as the various elastomer layers may have a soft or a hard  
10 setting and thereby affect the elasticity and the resistance to temperatures and mechanical conditions.

Of course, it is possible to modify and vary the product of the invention within the scope of the invention. Thus,  
15 e.g. a silicone-coated plastics sheet may be used instead of paper as a carrier sheet. Further, it is also possible to omit the white cover layer if the transfer is just used on white textiles and to apply a transparent elastomer layer on the colour toner layer and then the glue  
20 layer. Moreover, while the white cover layer (7) or the last transparent elastomer layer (6) is still wet, it may also be decided to apply to said layer a layer of hot melt powder which is fused into the elastomer in an infrared/hot air drying oven. This method saves a printing  
25 operation, but the transfer has a somewhat harder appearance on the textile. Finally, the white cover layer may be printed directly on the toners, thereby allowing the one elastomer layer to be omitted. However, this variation can be used only where a textile having a very even  
30 non-textured surface is involved, since, otherwise, the white elastomer will pull the toners apart during the application and thereby create a more blurred image.

## PATENT CLAIMS

1. A transfer capable of applying one- or multi-coloured patterns to textiles under heat and pressure, characterized in that it comprises a carrier sheet (1) having a non-binding surface which carries
- 5 (a) a one- or multi-coloured pattern (5) printed on the carrier sheet using a digitally controlled colour printer;
- 10 (b) a transparent (6) or white-pigmented (7) elastomer layer of a polymer having a high plasticizing point printed configuratively on the pattern (5); and
- (c) a heat-activatable thermoplastic polymeric glue layer (8) printed configuratively on the transparent (6) or
- 15 white-pigmented (7) elastomer layer, or a heat-activatable hot melt granulate sprinkled on the elastomer layer while this was still wet.
2. A transfer capable of applying one- or multi-coloured patterns to textiles under heat and pressure, characterized in that it comprises a carrier sheet (1) having a non-binding surface which carries
- 20 (a) a first transparent elastomer layer (4) of a polymer having a high plasticizing point printed configuratively on the carrier sheet (1);
- 25 (b) a one- or multi-coloured pattern (5) printed on the first elastomer layer (4) using a digitally controlled colour printer;
- (c) a second transparent (6) or white-pigmented (7) elastomer layer of a polymer having a high plasticizing point printed configuratively on the pattern (5); and
- 30 (d) a heat-activatable thermoplastic polymeric glue layer (8) printed configuratively on the transparent (6) or white-pigmented (7) elastomer layer, or a heat-activatable hot melt granulate sprinkled on the elastomer layer while this was still wet.
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3. A transfer capable of applying one- or multi-coloured patterns to textiles under heat and pressure, **characterized** in that it comprises a carrier sheet (1) having a non-binding surface which carries

(a) a first transparent elastomer layer (4) of a polymer having a high plasticizing point printed configuratively on the carrier sheet;

(b) a one- or multi-coloured pattern (5) printed on the elastomer layer (4) using a digitally controlled colour printer;

(c) a second transparent elastomer layer (6) of a polymer having a high plasticizing point printed configuratively on the pattern (5);

(d) a white-pigmented elastomer layer (7) of a polymer having a high plasticizing point printed configuratively on the second transparent elastomer layer (6); and

(e) a heat-activatable thermoplastic polymeric glue layer (8) printed configuratively on the white elastomer layer (7) or a heat-activatable hot melt granulate sprinkled on the elastomer layer while this was still wet.

4. A transfer according to any one of claims 1-3, **characterized** in that the carrier sheet (1) consists of paper or a heat-resistant plastic sheet coated with a thin layer of silicone or polyolefin.

5. A transfer according to any one of claims 1-3, **characterized** in that the carrier sheet (1) is a polyolefin sheet.

6. A transfer according to claim 5, **characterized** in that the polyolefin sheet consists of high density polypropylene.

7. A transfer according to any one of claims 1-6, **characterized** in that the transparent elastomer layers (4) and/or (6) consist of an elastomer polyurethane having a high plasticizing point applied in the form of a solution in an organic solvent.

8. A transfer according to any one of claims 1-7, **characterized** in that the white elastomer layer (7) consists of an elastomer polyurethane having a high plasticizing point which is pigmented with a white inorganic pigment, applied in the form of a solution in an organic solvent.

9. A transfer according to any one of claims 1-6, **characterized** in that the transparent elastomer layers (4) and/or (6) consist of an elastomer polyurethane having a high plasticizing point applied in the form of an aqueous solution.

10. A transfer according to any one of claims 1-6 and 9, **characterized** in that the white elastomer layer (7) consists of an elastomer polyurethane having a high plasticizing point which is pigmented with a white inorganic pigment, applied in the form of an aqueous solution.

11. A transfer according to any one of claims 1-10, **characterized** in that the glue layer (8) consists of polyurethane thermoplastics having a plasticizing point in the range 120-160 °C containing dispersed fine particles of a hot melt of copolyamide or high density polyethylene type having a melting point of 100-140 °C in the ratio 1:1, applied in the form of a solution of the polyurethane in an organic solvent with dispersed hot melt powder.

12. A transfer according to any one of claims 1-10, **characterized** in that the glue layer (8) consists of polyurethane thermoplastics having a plasticizing point in the range 120-160 °C containing dispersed fine particles of a hot melt of copolyamide or high density polyethylene type having a melting point of 100-140 °C in the ratio 1:1, applied in the form of an aqueous solution of the polyurethane with dispersed hot melt powder.

13. A transfer according to any one of claims 1-12, **characterized** in that the transparent elastomer layers (4) and/or (6), the white elastomer layer (7) and the glue layer (8) are printed on the carrier sheet (1) by silk screen printing processes in the same register and configuration on top of one another.

14. A transfer according to any one of claims 1-13, **characterized** in that the coloured pattern (5) is printed on the carrier sheet (1) or the first transparent elastomer layer (4) by means of a dry electrostatic colour toner printer, an ink jet printer with liquid dye or a thermotransfer colour printer, all of which are digitally controlled.

15. A method of making a transfer capable of applying one- or multi-coloured patterns to textiles under heat and pressure, **characterized** by, on a carrier sheet (1) having a non-binding surface,

(a) printing a one- or multi-coloured pattern (5) using a digitally controlled colour printer;

(b) on top of the pattern (5), configuratively printing a transparent (6) or white-pigmented (7) elastomer layer of a polymer having a high plasticizing point; and

(c) on top of the transparent (6) or white-pigmented (7) elastomer layer, configuratively printing a heat-

activatable thermoplastic polymeric glue layer (8) or, while the elastomer layer is still wet, sprinkling a heat-activatable hot melt granulate on said layer.

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16. A method of making a transfer capable of applying one- or multi-coloured patterns to textiles under heat and pressure, **characterized** by, on a carrier sheet (1) having a non-binding surface,

- 10 (a) configuratively printing a first transparent elastomer layer (4) of a polymer having a high plasticizing point;
- (b) on top of the first elastomer layer (4), printing a one- or multi-coloured pattern (5) using a digitally
- 15 controlled colour printer;
- (c) on top of the pattern (5), printing a second transparent (6) or white-pigmented (7) elastomer layer of a polymer having a high plasticizing point; and
- (d) on top of the transparent (6) or white-pigmented (7)
- 20 elastomer layer, configuratively printing a heat-activatable thermoplastic polymeric glue layer (8) or, while the elastomer layer is still wet, sprinkling a heat-activatable hot melt granulate on said layer.

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17. A method of making a transfer capable of applying a one- or multi-coloured pattern to textiles under heat and pressure, **characterized** by, on a carrier sheet (1) having a non-binding surface,

- 30 (a) configuratively printing a first transparent elastomer layer (4) of a polymer having a high plasticizing point;
- (b) on top of the first elastomer layer (4), printing a one- or multi-coloured pattern (5) using a digitally
- 35 controlled colour printer;

- (c) on top of the pattern (5), configuratively printing a second transparent elastomer layer (6) of a polymer having a high plasticizing point;
- (d) on top of the second elastomer layer (6), configuratively printing a white-pigmented elastomer layer (7) of a polymer having a high plasticizing point; and
- (e) on top of the white-pigmented elastomer layer (7), configuratively printing a heat-activatable thermoplastic polymeric glue layer (8) or, while the elastomer layer is still wet, sprinkling a heat-activatable hot melt granulate on said layer.

18. A method according to any one of claims 15-17, **characterized** by applying the transparent elastomer layers (4) and/or (6) in the form of an organic solution of an elastomer polyurethane having a high plasticizing point.

19. A method according to any one of claims 15-18, **characterized** by applying the white elastomer layer (7) in the form of an organic solution of an elastomer polyurethane having a high plasticizing point which is pigmented with a white inorganic pigment.

20. A method according to any one of claims 15-17, **characterized** by applying the transparent elastomer layers (4) and/or (6) in the form of an aqueous solution of an elastomer polyurethane having a high plasticizing point.

21. A method according to any one of claims 15-17 and 20, **characterized** by applying the white elastomer layer (7) in the form of an aqueous solution of an elastomer polyurethane having a high plasticizing point which is pigmented with a white inorganic pigment.

22. A method according to any one of claims 15-21, **characterized** by applying the glue layer (8) in the form of



an organic solution of polyurethane thermoplastics having a plasticizing point in the range 120-160 °C in which a fine hot melt powder of copolamide or high density polyethylene type having a melting point of 100-140 °C is dispersed in the ratio 1:1.

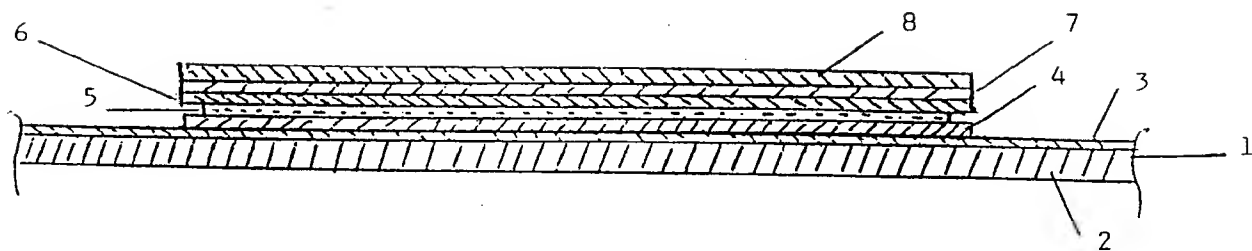
23. A method according to any one of claims 15-21, **characterized** by applying the glue layer (8) in the form of an aqueous solution of polyurethane thermoplastics having a plasticizing point in the range 120-160 °C in which a fine hot melt powder of copolyamide or high density polyethylene type having a melting point of 100-140 °C is dispersed in the ratio 1:1.

24. A method according to any one of claims 15-23, **characterized** by printing the transparent elastomer layers (4) and/or (6), the white elastomer layer (7) and the glue layer (8) on the carrier sheet (1) by silk screen printing processes in the same register and configuration on top of one another.

25. A method according to any one of claims 15-24, **characterized** by printing the coloured pattern (5) on the carrier sheet (1) or the first transparent elastomer layer (4) by means of a dry electrostatic colour toner printer, an ink jet printer with liquid dye or a thermotransfer colour printer, all of which are digitally controlled.

26. A textile product on which a one- or multi-coloured pattern is attached by application from a transfer according to any one of claims 1-14.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 96/00535

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: D06P 7/00, D06Q 1/12, B44C 1/16  
According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: D06P, D06Q, B44C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EDOC, CAPLUS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4773953 A (DONALD S. HARE), 27 Sept 1988 (27.09.88) --	1-26
A	WO 9207990 A1 (REFLEX PROMOTION INTERNATIONAL A/S), 14 May 1992 (14.05.92) --	1-26
A	WO 8601097 A1 (AVERY INTERNATIONAL CORPORATION), 27 February 1986 (27.02.86) -- -----	1-26

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:

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"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

3 March 1997

Date of mailing of the international search report

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

03/02/97

International application No.

PCT/DK 96/00535

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4773953	27/09/88	CA-A- 1321106	10/08/93
		DE-A, T- 3786121	15/07/93
		EP-A, B- 0256058	24/02/88
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		JP-B- 7029519	05/04/95
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		WO-A- 8704393	30/07/87
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WO-A1- 8601097	27/02/86	AU-A- 4725685	07/03/86
		EP-A- 0190316	13/08/86
		JP-T- 61503018	25/12/86
		US-A- 4685984	11/08/87

## PATENT COOPERATION TREATY

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## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

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in its capacity as elected Office

Date of mailing (day/month/year)

11 July 1997 (11.07.97)

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PCT/DK96/00535

Applicant's or agent's file reference

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16 December 1996 (16.12.96)

Priority date (day/month/year)

14 December 1995 (14.12.95)

Applicant

FRANKE, Kell, Erik

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

26 June 1997 (26.06.97)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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REC'D 01 APR 1998

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P199501144 WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK96/00535	International filing date (day/month/year) 16.12.1996	Priority date (day/month/year) 14.12.1995
International Patent Classification (IPC) or national classification and IPC <sub>6</sub> D 06 P 7/00, D 06 Q 1/12, B 44 C 1/16		
Applicant Franke, Kell Erik et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  26.06.1997	Date of completion of this report  24.03.1998
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Solveig Gustavsson Telephone No. 08-782 25 00

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DK96/00535

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

- ☒ the international application as originally filed.
- ☐ the description, pages \_\_\_\_\_, as originally filed,  
 pages \_\_\_\_\_, filed with the demand,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the claims, Nos. \_\_\_\_\_, as originally filed,  
 Nos. \_\_\_\_\_, as amended under Article 19,  
 Nos. \_\_\_\_\_, filed with the demand,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
 sheets/fig \_\_\_\_\_, filed with the demand  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/DK96/00535

**V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-26</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-26</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-26</u>	YES
	Claims		NO

**2. Citations and explanations**

The claimed invention relates to a transfer capable of applying single- or multicoloured patterns to textiles, a method for making such a transfer and a textile product with a pattern originating from the transfer.

The transfer comprises a carrier sheet, a coloured pattern printed on the carrier sheet, a transparent or white-pigmented elastomer layer and a heat-activated thermoplastic polymeric glue. The transfer can also comprise an extra layer of elastomer placed on either side of the coloured pattern. The coloured pattern is printed using a digitally controlled colour printer.

The object of the invention is to achieve transfers for decorating textiles where the patterns are sharp and have high washing and cleaning fastness.

The closest related prior art is WO 92/07990, A1. This document reveals a transfer comprising a carrier sheet, a printed colour image and a layer of an extender. The colour layer or the extender layer may also contain an elastomer that are fused into the actual layer.

The claimed invention differs from this cited document in that no extender is used, in that the elastomer constitutes a separate layer and in that a digitally controlled colour printer is used. The transferred image according to the claimed invention will give sharp images also on coloured textiles and on textiles that are not very smooth.

Thus, claims 1-26 are considered to fulfil the requirements of novelty, inventive step and industrial applicability.



PCT

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## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

PCT/DK 96/00535

International Filing Date

16 ~~18~~ DECEMBER 1996

Patentdirektoratet  
Danish Patent Office

Name of receiving Office (Patent Cooperation Treaty)

Applicant's or agent's file reference

(if desired) (12 characters maximum)

P199501144 WO

**Box No. I TITLE OF INVENTION**

A transfer for decorating textiles with coloured patterns

**Box No. II APPLICANT**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Franke, Kell Erik  
Øster Søgade 10  
DK-1357 Copenhagen K  
Denmark

☒ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (i.e. country) of nationality:

DK Denmark

State (i.e. country) of residence:

DK Denmark

This person is applicant  
for the purposes of:



all designated States



all designated States except the United States of America



the United States of America only



the States indicated in the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Strand, Eilif  
Rugdeveien 25  
N-3030 Drammen  
Norway

This person is:



applicant only



applicant and inventor



inventor only (If this check-box is marked, do not fill in below.)

State (i.e. country) of nationality:

NO Norway

State (i.e. country) of residence:

NO Norway

This person is applicant  
for the purposes of:



all designated States



all designated States except the United States of America



the United States of America only



the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:



agent



common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Hofman-Bang & Boutard, Lehmann & Ree A/S  
Hans Bekkevolds Allé 7  
DK-2900 Hellerup  
Denmark

Telephone No.

45 39 48 80 00

Facsimile No.

45 39 48 80 80

Teleprinter No.

19 085 hbb dk

☐ Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Box No.V DESIGNATION STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☒ AP ARIPO Patent: KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

## National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AL Albania                               | <input checked="" type="checkbox"/> LV Latvia  |
| <input checked="" type="checkbox"/> AM Armenia                               | <input checked="" type="checkbox"/> MD Republic of Moldova   |
| <input checked="" type="checkbox"/> AT Austria                               | <input checked="" type="checkbox"/> MG Madagascar  |
| <input checked="" type="checkbox"/> AU Australia                             | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia   |
| <input checked="" type="checkbox"/> AZ Azerbaijan                            |  |
| <input checked="" type="checkbox"/> BB Barbados                              | <input checked="" type="checkbox"/> MN Mongolia  |
| <input checked="" type="checkbox"/> BG Bulgaria                              | <input checked="" type="checkbox"/> MW Malawi  |
| <input checked="" type="checkbox"/> BR Brazil                                | <input checked="" type="checkbox"/> MX Mexico  |
| <input checked="" type="checkbox"/> BY Belarus                               | <input checked="" type="checkbox"/> NO Norway  |
| <input checked="" type="checkbox"/> CA Canada                                | <input checked="" type="checkbox"/> NZ New Zealand   |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein  | <input checked="" type="checkbox"/> PL Poland  |
| <input checked="" type="checkbox"/> CN China                                 | <input checked="" type="checkbox"/> PT Portugal  |
| <input checked="" type="checkbox"/> CZ Czech Republic                        | <input checked="" type="checkbox"/> RO Romania   |
| <input checked="" type="checkbox"/> DE Germany                               | <input checked="" type="checkbox"/> RU Russian Federation  |
| <input checked="" type="checkbox"/> DK Denmark                               | <input checked="" type="checkbox"/> SD Sudan   |
| <input checked="" type="checkbox"/> EE Estonia                               | <input checked="" type="checkbox"/> SE Sweden  |
| <input checked="" type="checkbox"/> ES Spain                                 | <input checked="" type="checkbox"/> SG Singapore   |
| <input checked="" type="checkbox"/> FI Finland                               | <input checked="" type="checkbox"/> SI Slovenia  |
| <input checked="" type="checkbox"/> GB United Kingdom                        | <input checked="" type="checkbox"/> SK Slovakia  |
| <input checked="" type="checkbox"/> GE Georgia                               | <input checked="" type="checkbox"/> TJ Tajikistan  |
| <input checked="" type="checkbox"/> HU Hungary                               | <input checked="" type="checkbox"/> TM Turkmenistan  |
| <input checked="" type="checkbox"/> IL Israel                                | <input checked="" type="checkbox"/> TR Turkey  |
| <input checked="" type="checkbox"/> IS Iceland                               | <input checked="" type="checkbox"/> TT Trinidad and Tobago   |
| <input checked="" type="checkbox"/> JP Japan                                 | <input checked="" type="checkbox"/> UA Ukraine   |
| <input checked="" type="checkbox"/> KE Kenya                                 | <input checked="" type="checkbox"/> UG Uganda  |
| <input checked="" type="checkbox"/> KG Kyrgyzstan                            | <input checked="" type="checkbox"/> US United States of America  |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea |  |
| <input checked="" type="checkbox"/> KR Republic of Korea                     | <input checked="" type="checkbox"/> UZ Uzbekistan  |
| <input checked="" type="checkbox"/> KZ Kazakhstan                            | <input checked="" type="checkbox"/> VN Viet Nam  |
| <input checked="" type="checkbox"/> LK Sri Lanka                             |  |
| <input checked="" type="checkbox"/> LR Liberia                               | Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet: |
| <input checked="" type="checkbox"/> LS Lesotho                               | <input checked="" type="checkbox"/> CU Cuba  |
| <input checked="" type="checkbox"/> LT Lithuania                             | <input checked="" type="checkbox"/> LC Saint Lucia   |
| <input checked="" type="checkbox"/> LU Luxembourg                            | <input checked="" type="checkbox"/> BA Bosnia and Herzegovina  |

In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of \_\_\_\_\_

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

**Box No. VI PRIORITY CLAIM**Further priority claims are indicated in the Supplemental Box ☐

The priority of the following earlier application(s) is hereby claimed:

Country (in which, or for which, the application was filed)	Filing Date (day/month/year)	Application No.	Office of filing (only for regional or international application)
item (1) DK Denmark	(14.12.95) 14 December 1995	1417/95	
item (2)			
item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☐ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):
**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA / SE

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request.

Country (or regional Office):

Date (day/month/year):

Number:

DK

20.12.95

DK 95/01318

**Box No. VIII CHECK LIST**

This international application contains the following number of sheets:

1. request : 3 sheets  
 2. description : 20 sheets  
 3. claims : 7 sheets  
 4. abstract : 1 sheets  
 5. drawings : 1 sheets

Total : 32 sheets

This international application is accompanied by the item(s) marked below:

1. ☐ separate signed power of attorney  
 2. ☐ copy of general power of attorney  
 3. ☐ statement explaining lack of signature  
 4. ☐ priority document(s) identified in Box No. VI as item(s):  
 5. ☒ fee calculation sheet  
 6. ☐ separate indications concerning deposited microorganisms  
 7. ☐ nucleotide and/or amino acid sequence listing (diskette)  
 8. ☒ other (specify): COPY of ITS DK 95/01318

Figure No. \_\_\_\_\_ of the drawings (if any) should accompany the abstract when it is published.

**Box No. IX SIGNATURE OF APPLICANT OR AGENT**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



Kell Erik Franke



Eilif Strand

For receiving Office use only

1. Date of actual receipt of the purported international application: <b>RO/DK 16 DECEMBER 1996</b> (16.12.96)	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority specified by the applicant: <b>ISA/SE</b>	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

**07 January 1997 (07.01.97)**

Transfer til dekorering af tekstiler med farvede mønstre

Opfindelsen angår en varmeapplikations-transfer til dekore-  
ring af tekstiler med farvede mønstre med særlig høje va-  
5 ske- og renseægtheder, hvor designet er frembragt ved hjælp  
af en digitalt styret farveprinter.

**OPFINDELSENS BAGGRUND**

10 Den mest almindelige form for fremstilling af transfers til  
påsætning af tekstiler er ved hjælp af silketryk, hvor hver  
enkelt farve påføres et siliconepapir. Nogle farver, såsom  
vinyl- og plastisolfarver er varmeaktiverbare, men er da  
ikke særlig holdbare uden yderligere behandling. Til for-  
15 bedring af holdbarheden påføres farverne normalt et "hot  
melt" granulatlag i form af et pulver, eller et finkornet  
granulat blandet i en extenderbase, som påtrykkes farverne  
og tjener som et særligt limlag mellem tekstil og farver,  
hvorved holdbarheden øges betragteligt. De vil imidlertid  
20 ved høje temperaturer, f.eks. under tørretumbling-  
processer, der i visse tilfælde benytter temperaturer op  
til 140 °C, løsne sig fra henholdsvis tekstilet eller et  
eventuelt limlag. Tokomponent-farver på opløsningsmiddelba-  
sis vil være mere stabile overfor temperaturpåvirkninger,  
25 men vil ved længere tids industrivask og tumbling, tørre ud  
og skalle af tekstilet.

I den internationale patentansøgning WO 92/07990 er der an-  
givet en mulig anvendelse af en farvekopimaskine med et to-  
30 komponent-farvetonersystem ved fremstilling af en transfer  
til tekstiler. Et sådant tokomponent-farvetonersystem er  
imidlertid ikke kendt på markedet for farvekopimaskiner i  
dag. De nuværende laser-farvekopimaskiner anvender farveto-  
nere af en énkomponent-termoplastisk formstof-type, hvor  
35 der ikke finder nogen polymerisation sted. Desuden er det

system, som beskrives i den ovennævnte internationale ansøgning, afhængigt af et farveløst tokomponent-extender-base-lag, som trykkes ovenpå det farvede billede og umiddelbart, mens det er vådt, belægges med et termoplastisk granulat, der tjener som limlag. Denne udførelsesform kan imidlertid kun anvendes på hvide tekstiler, og det overførte billede vil kun stå skarpt på meget glatte tekstiler.

Det er kendt teknik at anvende farvekopimaskiner til overførelse af billeder på et termoplastbelagt transferpapir, hvorfra det ved varme og tryk kan overføres til hvide bomuldstekstiler. De kendte produkter udviser imidlertid store svagheder i vask og rens, og tåler således kun vask ved ca. 40 °C et begrænset antal gange. Dette skyldes hovedsageligt at farvetonerne er forholdsvis ubeskyttet mod mekaniske påvirkninger og at de forbliver varmeaktiverbare allerede ved temperaturer fra ca. 90 °C. Ligeledes kan der kun trykkes på hvide tekstiler, og kun på tekstiler, hvor den overvejende del består af bomuld. Ønsker man at overføre farvebilleder af denne type på mørke tekstiler, behøver man indtil flere ekstra operationer til laminering og tilpasning af et hvidt dæklag under farvetonerne. Denne proces er både dyr og tidskrævende, desuden kan man ikke fremstille konfigorative mønstre, men kun hele dækflader.

25

#### OPFINDELSENS FORMÅL

Der findes en række datastyrede farveprintere af forskellige typer, der gengiver fire-farvede rasterbilleder med en opløsning på 400 dpi eller mere med næsten fotografisk udseende. Det er ikke muligt ved en ren silketryksproces at opnå opløsning på mere end 100 dpi, med deraf følgende tabt gengivelse af fine detaljer. Det ville derfor være en stor fordel at kunne anvende sådanne farveprintere til fremstilling af farvede og især flerfarvede konfigorative transfers

til tekstilindustrien. Det ville naturligvis også være en fordel at kunne bruge dataprogrammer til redigering af billeder og designs tillige med scannere, der overfører originalbilleder til data.

5

Det er opfindelsens formål at fremstille en farvet konfiguratativ transfer til tekstilindustrien, som kombinerer de store fordele, som opnås ved anvendelsen af en elektronisk farveprinter som den grafiske enhed, med en særlig stor holdbarhed i vask og rens.

10

#### **SAMMENFATNING AF OPFINDELSEN**

Da farvebilleder genereret fra almindelige printere til et transfersubstrat, ikke kan overføres umiddelbart til et tekstil i et konfigurativt mønster, opnås dette ifølge opfindelsen ved at benytte silketryksprocesser til fremstilling af beskyttelseslag og/eller dæklag samt limlag i henhold til opfindelsen.

20

I dens mest simple udførelsesform er transferen ifølge opfindelsen særegen ved, at den omfatter et bæreark med en ikke-bindende overflade, som bærer

- (a) et én- eller flerfarvet mønster trykt på bærearket under anvendelse af en digitalstyret farveprinter;
- (b) et transparent eller hvidtpigmenteret elastomerlag af en polymer med højt blødgøringspunkt trykt konfiguratativt på mønstret; og
- (c) et varmeaktiverbart termoplastisk polymert limlag trykt konfigurativt på det transparente eller hvidtpigmenterede elastomerlag, eller et varmeaktiverbart "hot melt granulat" drysset på elastomerlaget, mens dette endnu var vådt.

30

Ifølge opfindelsen har det overraskende vist sig, at de farvetonere, der normalt anvendes i flerfarvekopimaskiner, og som f.eks. kan være baseret på termoplastiske polyol-formstoffer, migrerer ind i overfladen af det påførte transparente eller hvidtpigmenterede elastomerlag og hærder op sammen med dette under indvirkning af den i elastomerlaget indeholdte isocyanathærder. Herved mister farvetonerne deres termoplastiske karakter og forbliver fasthæftet på elastomerlaget, således at det farvede mønster eller billede efter overførsel af transferen til et tekstil er holdbart i vask, også ved højere temperatur.

Hvis man ønsker at indkapsle det farvede mønster eller billede, så det bliver ekstra modstandsdygtigt over for slid og påvirkninger ved vask og rens, kan man forsyne det med et ekstra beskyttelseslag. I denne udførelsesform er transferen ifølge opfindelsen særegen ved, at den omfatter et bærearke med en ikke-bindende overflade, som bærer

- (a) et første transparent elastomerlag af en polymer med højt blødgøringspunkt trykt konfigurativt på bærearket;
- (b) et én- eller flerfarvet mønster trykt på det første elastomerlag under anvendelse af en digitalstyret farveprinter;
- (c) et andet transparent eller hvidtpigmenteret elastomerlag af en polymer med højt blødgøringspunkt trykt konfigurativt på mønstret; og
- (d) et varmeaktiverbart termoplastisk polymert limlag trykt konfigurativt på det transparente eller hvidtpigmenterede elastomerlag, eller et varmeaktiverbart "hot melt granulat" drysset på elastomerlaget, mens dette endnu var vådt.

Yderligere kan man, hvis transferen er beregnet til at påføres meget grove eller ujævne tekstiler, og man ønsker

at bevare fine detaljer i det farvede mønster eller billede, forsyne transferen med både et hvidtpigmenteret og et transparent elastomerlag (c); i dette tilfælde opnås den allerstærkeste indkapsling af det farvede mønster eller billede, når der først påføres et transparent og derpå et hvidtpigmenteret elastomerlag.

I den sidstnævnte udførelsesform er transferen ifølge opfindelsen særegen ved, at den omfatter et bæreak med en ikke-bindende overflade, som bærer

- (a) et første transparent elastomerlag af en polymer med højt blødgøringspunkt trykt konfigurativt på bæreaket;
- (b) et én- eller flerfarvet mønster (trykt på elastomerlaget under anvendelse af en digitalstyret farveprinter;
- (c) et andet transparent elastomerlag af en polymer med højt blødgøringspunkt trykt konfigurativt på mønstret;
- (d) et hvidtpigmenteret elastomerlag af en polymer med højt blødgøringspunkt trykt konfigurativt på det andet transparente elastomerlag; og
- (e) et varmeaktiverbart termoplastisk polymert limlag trykt konfigurativt på det hvidtpigmenterede elastomerlag, eller et varmeaktiverbart "hot melt granulat" drysset på elastomerlaget, mens dette endnu var vådt.

Bæreaket med en ikke-bindende overflade kan f. eks. bestå af papir eller en varmebestandig plastfolie, f. eks. af polyester, belagt med et tyndt lag silicone eller polyolefin; eller det kan f. eks. bestå af en polyolefinfolie, hensigtsmæssigt en folie af højdensitets (HD) polypropylen.

De transparente elastomerlag kan med fordel bestå af en elastomer polyurethan med højt blødgøringspunkt påtrykt i



form af en opløsning i et organisk opløsningsmiddel. Dette er specielt fordelagtigt i forbindelse med anvendelse af farvekopimaskiner af den tørelektrostatiske type, som normalt påfører en tynd siliconeolie på overfladen af  
5 fixervalserne for at forhindre tonerpartikler i at sætte sig fast på valserne. Små mængder af denne siliconeolie overføres på farvetonerne ved trykningen og vil kunne skade vedhæftningen af det efterfølgende elastomerlag. Men det organiske opløsningsmiddel i polyurethanlaget op-  
10 løser siliconehinden, således at polyurethanen forbinder sig med tonerne til en homogen enhed.

Imidlertid kan der med andre typer farveprintere, eller hvis der tages andre forholdsregler til undgåelse af si-  
15 liconehinden, også anvendes tilsvarende polyurethaner i vandig opløsning.

Det hvide elastomerlag, som eventuelt kan udelades, hvis transferen skal anvendes til overførsel af et mønster til  
20 hvide tekstiler, kan med fordel bestå af samme slags polyurethan som ovenfor, pigmenteret med et hvidt uorganisk pigment og påtrykt fra en organisk eller vandig opløsning.

25 Det afsluttende limlag kan med fordel bestå af en polyurethan-termoplast med et blødgøringspunkt i området 120-160 °C indeholdende dispergerede fine partikler af en "hot melt" af copolyamid- eller højdensitets polyethylen-type med et smeltepunkt på 100-140 °C i forholdet 1:1,  
30 påtrykt i form af en organisk eller vandig opløsning af polyurethanen med dispergeret "hot melt"-pulver.

En særlig variation af limlaget består i laminering af en termoplastisk støbt polyurethanfolie på det transparente  
35 eller hvide elastomerlag. En 100 µm tyk transparent eller

farvet aromatisk polyesterfilm med et blødgøringspunkt på ca. 160 °C, en hårdhed på 93° Shore og en elasticitet på 400 % er særlig velegnet til formålet. De silketrykte polyurethanlag og polyurethanfolien kan lamineres sammen  
5 ved 160 °C under let pres, således at folien ikke smelter, men kun klæber til det påtrykte lag. Under påsætning af den færdige transfer på et tekstil, som sker ved 200 °C og 320 kPa i 12 sekunder, smelter polyurethanfolien og danner et meget stærkt limlag mellem tekstilet og det  
10 trykte billede.

I en fordelagtig udførelsesform af opfindelsen er de transparente elastomerlag, det hvide elastomerlag og limlaget trykt på bæreakset ved silketryksprocesser i samme  
15 registrering og konfiguration oven på hverandre. Af hensyn til eventuelle unøjagtigheder i registreringen vil limlaget dog i praksis normalt rage 1-2 mm ud over konfigurationen af de øvrige lag.

20 Det én- eller flerfarvede mønster er som anført trykt på det første elastomerlag under anvendelse af en digitalstyret farveprinter. Opfindelsen er meget fleksibel m.h.t. valg af farveprinter. Man kan groft skelne imellem digitalstyrede farveprintere, der arbejder med pulvertone-  
25 nere, flydende farvestoffer eller farvebånd.

I overensstemmelse hermed vil det farvede mønster i en transfer ifølge opfindelsen normalt være trykt på det første transparente elastomerlag ved hjælp af en tør  
30 elektrostatisk farvetoner-printer, en ink-jet-printer med flydende farvestof eller en termotransfer-farveprinter, der alle er digitalstyret.

Opfindelsen omfatter også en fremgangsmåde til fremstilling  
35 af en transfer som beskrevet ovenfor, hvilken fremgangsmåde

er særegen ved, at man på et bæreak med en ikke-bindende overflade

- (a) trykker et én- eller flerfarvet mønster under anvendelse af en digitalstyret farveprinter;
- 5 (b) oven på mønstret konfigurativt trykker et transparent eller hvidtpigmenteret elastomerlag af en polymer med højt blødgøringspunkt; og
- (c) oven på det transparente eller hvidtpigmenterede elastomerlag konfigurativt trykker et varmeaktiverbart
- 10 termoplastisk polymert limlag eller, mens elastomerlaget endnu er vådt, drysser et varmeaktiverbart "hot melt granulat" på dette.

En anden udførelsesform af fremgangsmåden ifølge opfindelsen er særegen ved, at man på et bæreak (1) med en ikke-bindende overflade

- (a) konfigurativt trykker et første transparent elastomerlag (4) af en polymer med højt blødgøringspunkt;
- (b) oven på det første elastomerlag (4) trykker et én- eller flerfarvet mønster (5) under anvendelse af en digitalstyret farveprinter;
- 20 (c) oven på mønstret (5) konfigurativt trykker et andet transparent (6) eller hvidtpigmenteret (7) elastomerlag af en polymer med højt blødgøringspunkt; og
- 25 (d) oven på det transparente (6) eller hvidtpigmenterede (7) elastomerlag konfigurativt trykker et varmeaktiverbart termoplastisk polymert limlag (8) eller, mens elastomerlaget endnu er vådt, drysser et varmeaktiverbart "hot melt granulat" på dette.

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Endnu en udførelsesform af fremgangsmåden ifølge opfindelsen er særegen ved, at man på et bæreak med en ikke-bindende overflade

- (a) konfigurativt trykker et første transparent elastomerlag
- 35 af en polymer med højt blødgøringspunkt;

- (b) oven på det første elastomerlag trykker et én- eller flerfarvet mønster under anvendelse af en digitalstyret farveprinter;
- (c) oven på mønstret konfigurativt trykker et andet transparent elastomerlag af en polymer med højt blødgøringspunkt;
- (d) oven på det andet elastomerlag konfigurativt trykker et hvidtpigmenteret elastomerlag af en polymer med højt blødgøringspunkt; og
- (e) oven på det hvidtpigmenterede elastomerlag konfigurativt trykker et varmeaktiverbart termoplastisk polymert limlag eller, mens elastomerlaget endnu er vådt, drys-ser et varmeaktiverbart "hot melt granulat" på dette.

I overensstemmelse med det ovenfor anførte påtrykkes de transparente elastomerlag med fordel i form af en organisk opløsning af en elastomer polyurethan med højt blødgøringspunkt; men det kan også ske i form af en vandig opløsning.

20

Det hvide elastomerlag kan så med fordel påtrykkes i form af en tilsvarende organisk eller vandig polyurethanopløsning, som er pigmenteret med et hvidt pigment.

Endvidere kan limlaget med fordel påføres i form af en organisk eller vandig opløsning af en polyurethan-termoplast med et blødgøringspunkt i området 120-160 °C, hvori der er dispergeret et fint "hot melt"-pulver af copolyamid- eller højdensitets polyethylen-type med et smeltepunkt på 100-140 °C i forholdet 1:1.

I en fordelagtig udførelsesform af fremgangsmåden ifølge opfindelsen trykkes de transparente elastomerlag, det hvide elastomerlag og limlaget på bærearket ved silke-tryksprocesser i samme registrering og konfiguration oven

på hverandre. Men som før nævnt vil man af hensyn til eventuelle unøjagtigheder i registreringen normalt trykke limlaget i en konfiguration, som rager 1-2 mm ud over konfigurationen af de øvrige lag.

5

Endvidere trykkes det farvede mønster almindeligvis på det første transparente elastomerlag ved hjælp af en tør elektrostatiske farvetoner-printer, en ink-jet-printer med flydende farvestof eller en termotransfer-farveprinter, 10 der alle er digitalstyret.

Hvis transferen skal anvendes til overførsel af et mønster til hvide tekstiler, er det ifølge opfindelsen muligt at udelade det hvide elastomerlag og trykke limlaget 15 direkte på det andet transparente elastomerlag.

Det er ifølge opfindelsen også muligt, hvis transferen skal anvendes til overførsel af et mønster til tekstiler med en meget jævn og ustruktureret overflade, at udelade 20 det andet transparente elastomerlag og trykke det hvide elastomerlag direkte på det én- eller flerfarvede mønster.

Endelig er det også ifølge opfindelsen muligt at udelade 25 limlaget og, hvor det drejer sig om overførsel til hvide tekstiler, eventuelt også det hvide elastomerlag, i hvilket tilfælde overfladen af henholdsvis det hvide elastomerlag og det andet transparente elastomerlag modificeres til at være varmeaktiverbar. Dette gøres ifølge opfindelsen mest hensigtsmæssigt ved, at der umiddelbart efter 30 trykningen af elastomerlaget, mens dette stadig er vådt, strøs et fint "hot melt"-pulver af copolyamid- eller højdensitets polyethylen-type med et smeltepunkt på 100-140 °C ud på overfladen.

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Opfindelsen omfatter også tekstilprodukter, på hvilke der er fasthæftet et én- eller flerfarvet mønster ved overførsel fra en transfer ifølge opfindelsen.

- 5 Fremgangsmåden og transferen ifølge opfindelsen giver, især ved mindre oplagstal, indlysende omkostningsbesparende fordele.

#### DETALJERET BESKRIVELSE AF OPFINDELSEN

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Opfindelsen belyses nærmere ved den følgende detaljerede beskrivelse af forskellige udførelsesformer for denne med henvisning til tegningen, som skematisk viser opbygningen af en transfer ifølge opfindelsen.

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- På tegningen ses et bæreak (1) opbygget af et papirark eller en varmebestandig plastfolie (2) belagt med et tyndt sliplag af silicone eller polyolefin (3). På silicone- eller polyolefinoverfladen er der ved silketrykning konfigurat
- 20 rativt trykt et første transparent elastomerlag (4) og oven på dette er med en digitalstyret farveprinter trykt et én- eller flerfarvet mønster (5). Oven på det farvede mønster er der igen ved silketrykning konfigurativt trykt et andet transparent elastomerlag (6), og oven på dette er der på
- 25 samme måde trykt et hvidtpigmenteret elastomerlag (7). Øverst er der på samme måde trykt et varmeaktiverbart termoplastisk polymert limlag (8).

- På et bæreak (1) med en ikke-bindende overflade, f. eks.
- 30 af papir eller varmebestandig plastfolie (2) belagt med silicone eller polyolefin (3) eller helt af polyolefin, f. eks. HD polypropylen, påføres et tyndt transparent elastomerlag (4), f. eks. en organisk opløsning af en elastomer polyurethan med højt blødgøringspunkt, i silketryk med en
- 35 34T dug i en ønsket konfiguration. Dette første elastomer-

lag (4) tørres herefter i en infrarød/varmluft tørretunnel ved ca. 70-80 °C.

Bærearket (1) med påtrykt elastomerlag (4) påtrykkes nu det  
5 ønskede mønster (5) spejlvendt indenfor det elastomerbelagte område ved hjælp af en farveprinter, f.eks. en firefarve-kopimaskine af typen "Ricoh NC5006", der arbejder med et dual pulvertoner-system og en opløsning på 400 dpi. Efter at trykket er blevet fixeret i maskinens varmesektion, er  
10 tonerne, som består af termoplast, stadig varmeaktiverbare ved selv relativt lave temperaturer (ca. 90 °C). For at stabilisere tonerne til senere at kunne modstå højere temperaturer, trykkes et andet transparent elastomerlag (6) over farvetonerne, f. eks. af den samme polyurethanopløsning  
15 som elastomerlaget (4). Polyurethanlagets opløsningsmiddel neutraliserer siliconehinden, der påføres tonerne under varmfikseringen i farvekopimaskinen, og polymer/isocyanatblandingen forbinder sig med tonerne til en homogen enhed,  
20 den. Der er nu skabt et godt beskyttet farvelag mellem to polyurethanlag, som ikke er varmeaktiverbare ved transferens overførselstemperatur.

Da tonerne ikke har nogen særlig god dækkeevne på andre end  
25 hvide tekstiler, påtrykkes nu et hvidtpigmenteret elastomerlag (7), f. eks. af en polyurethan med samme kemiske sammensætning som de foregående transparente lag og i samme konfiguration som de øvrige lag. Dette lag kan, mens det stadig er vådt, påføres et varmeaktiverbart granulat af en  
30 polyamidbaseret "hot melt", der tjener som limlag mellem transferen og substratet, eller det hvide dæklag (7) påtrykkes et varmeaktiverbart termoplastisk polymert limlag (8), f. eks. bestående af en varmeaktiverbar polyurethantermoplast blandet med et fint "hot melt" pulver af copolyamid i forholdet 1:1.  
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Transferen kan nu påsættes alle almindelige tekstiler på sædvanlig måde ved 170-180 °C i 8-12 sekunder og et tryk på ca. 310 kPa.

- 5 Med hensyn til anvendelige farveprintere kan man groft skelne imellem digitalstyrede farveprintere, der arbejder med pulvertone, flydende farvestoffer eller farvebånd. Af farvekopimaskiner, der anvender pulvertone ved en tør elektrostatiske proces, kan nævnes: "Canon® CLC 700",  
10 "Ricoh® NC 5006" og "Rank Xerox® 5775". Af digitalstyrede farveprintertyper, der anvender flydende farvestoffer, kan fremhæves: "Indigo Eprint 1000", "IBM Color Jetprinter PS 4079" og "Canon® BJC-880". Endelig kan af digitalstyrede såkaldte termotransfer-farveprintere, som arbejder med farvebånd, f. eks. nævnes: "ABDICK", "Seiko® ColorPoint 2 PSF-14" og "Fargo Pictura 310".  
15

Hvert system har sine omkostnings/kvalitets-parametre, som man frit kan vælge imellem. De elastomerlag, som indkapsler farvelaget, kan tilpasses de forskellige printere f. eks. ved hjælp af overfladeaktive additiver eller elektronisk overfladebehandling. Dette gælder både vandbaserede og opløsningsmiddelbaserede polymere. Anvendes flydende farvestoffer, vil man dog altid foretrække vand-  
20 faste farver.  
25

Moderne digitalstyrede farveprintere er kompatible med en række standard software redigeringsprogrammer, f. eks. Windows 3.X, IBM OS/2, Apple System 6 og 7 samt det mere  
30 avancerede Adobe Postscript Level 2.

Foretrukne polymere med højt blødgøringspunkt til fremstilling af elastomerlagene (4), (6) og (7) er elastomere polyurethaner, såsom en énkomponent fuldt reageret lineær poly-  
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urethan på basis af polyester og alifatisk diisocyanat eller en énkompont fuldt reageret polyurethan på basis af polyester og aromatisk diisocyanat. Den termoplastiske polymer til anvendelse i limlaget (8) er fortrinsvis en tilsvarende polyurethan indstillet til at have et lavere blødgøringspunkt og dermed være varmeaktiverbar sammen med "hot melt"-pulveret.

Af andre anvendelige elastomersystemer kan nævnes tokompont-polyurethan-tekstilfarver f.eks. "Bargoscreen S18/50" fra firma Aaberg eller "Maraflo TK" fra firma Marabu. Disse farvesystemer består af 1-methoxy-2-propylacetat og 3-methoxy-n-butylacetat tilsat polyurethan-bindemidler. Som hærder anvendes diisocyanat. De anbefalede fortyndere til disse systemer - cyclohexanon eller ethylglycolacetat - er relativt aggressive overfor tonerne i billedlaget og skal derfor tilsættes i så små mængder som muligt, samtidigt bør bæreaktet behandles forsigtigt uden større mekaniske påvirkninger indtil elastomerlaget på tonerne er tørret op.

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Det skal understreges, at der udover nævnte polyurethankomponenter også kan anvendes en lang række andre termoplastiske formstoffer som f. eks. polyolefiner, ethylen-vinylacetat-copolymerer, ethylen-ethylacrylat-copolymerer, ethylen-acrylsyre-copolymerer, ionomerer, polyestere, polyamider, acrylformstoffer etc.

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Ved anvendelse af elastomersystemer, som er vand-dispergerede og derfor ikke indeholder opløsningsmidler, kan der i vask opstå separationsproblemer mellem tonerlaget og det efterfølgende påtrykte transparente lag. Dette skyldes at farvekopimaskiner af den tørelektrostatisk type normalt anvender en tynd siliconeolie på overfladen af fixervalserne, som forhindrer tonerpartikler i at sætte sig fast på valserne. Det kan ikke undgås, at små mængder af silico-

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neolie efterlades på overfladen af farvetonerne og medfører separation eller dannelse af luftlommer mellem tonerlaget og det efterfølgende påtrykte polyurethanlag, især under vaskning. Såfremt man ønsker at benytte et vandbaseret farve/lak-system, kan problemet løses ved at benytte infrarød 5 varmekopiering af tonerne alene, eller keramiske fixeringsvalser, eller andre valser, der ikke kræver siliconeolie.

Fortrukken fremstillingsmetode:

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Som det fremgår af tegningen, trykkes enkeltvis på et bærear-  
ark (1), normalt bestående af et papir på ca. 105 g/m<sup>2</sup> (2)  
belagt med et sliplag af silicone (3), flere på hinanden  
følgende polymer- og billedlag, der danner den færdige  
15 transfer.

Først trykkes et transparent elastomerlag (4), fortrinsvis  
bestående af en polyurethan med højst muligt smeltepunkt,  
som efter overførslen til substratet danner et beskyttende  
20 toplag. Særlig egnet var en 25% opløsning i propylenglycol-  
methylether af en lineær fuldt reageret polyurethan på ba-  
sis af polyester og alifatisk diisocyanat med et blødgø-  
ringspunkt på 195-205 °C.

25 Derefter trykkes det ønskede billede (5) i en tørelektro-  
statisk farvekopimaskine. En særligt egnet farvekopimaskine  
er en "Ricoh NC5006", der producerer farvekopier med en op-  
løsning på 400 dpi med 256 nuancer pr. punkt. I andre far-  
vekopimaskiner kører kopipapiret rundt om en tromle, og det  
30 begrænser valget af kopimaterialer. NC5006 benytter sig  
derfor af et transferbælte til at overføre originalbilledet  
til kopiarket. Den lige papirgang medfører, at der kan ko-  
pieres på forskellige typer papir og transparenter.

- Der trykkes nu et transparent elastomerlag (6), som forbin-  
der sig med tonerne, og som består af samme komposition som  
det første elastomerlag (4). Tonerne ligger nu godt beskyt-  
tet mellem de to elastomerlag. Derefter trykkes et hvidt  
5 dæklag (7) bestående af samme polyurethantype som det før-  
ste og andet transparente elastomerlag, men pigmenteret med  
organiske eller uorganiske farvepigmenter, f. eks. titandi-  
oxid.
- 10 Til sidst trykkes et limlag (8), som forbinder transferen  
(3) med tekstilet. Limlaget består af en blanding af en po-  
lyurethan, der er en blødere indstillet énkomponent-poly-  
urethan med et smeltepunkt på 150-160 °C, og et "hot melt"-  
pulver på copolyamidbasis i forholdet 1:1. "Hot melt"-  
15 pulverets smeltepunkt ligger ved ca. 115-130 °C, og korn-  
størrelsen er ikke over 80 µm. Et særligt egnet hot melt  
pulver har vist sig at være et copolyamid på basis af poly-  
meriserede, overvejende dimeriserede fedtsyrer eller disses  
estere og hovedsageligt alifatiske diaminer. Disse "hot  
20 melts" besidder stor modstandskraft overfor vaske- og ren-  
semidler, selv ved høje temperaturer (80-90 °C).

Énkomponent-polyurethanlimen tjener primært som fyldstof  
for den pulverformede "hot melt", men virker også selv som  
25 termoplast. F.eks. egner en 35% opløsning i dimethylforma-  
mid/toluen/methylethylketon af en énkomponent-polyurethan-  
lim på basis af polyester og aromatisk diisocyanat med et  
blødgøringspunkt på 150-160 °C sig særlig godt til formå-  
let.

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Limlaget virker som rent reversibel termoplast, d.v.s. at  
der ved overførslen af transferen til tekstilet - ved hjælp  
af varme og tryk - ikke finder nogen udhærdning eller tvær-  
binding sted. Under påvirkningen af varme og tryk ved på-  
35 sætning af tekstilet smelter både "hot melt'en" og énkomp-

nent-polyurethanen og bliver presset ned mellem tekstilfibre og forankrer dermed transferen mekanisk.

#### EKSEMPEL 1

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Et firefarvet mønster eller billede (5) af en tokomponent-toner med en partikkelstørrelse på 6,4  $\mu\text{m}$  blev direkte påført den ikke-bindende overflade på et bæreak (1) i en Ricoh NC 5006 farvekopimaskine. Efterfølgende blev et hvidtpigmenteret tokomponent-polyurethanelastomerlag (7) påtrykt oven på tonerbilledet i silketryk. Som tokomponent-elastomer blev anvendt "Bargoscreen S18/50" polyurethan-tekstilfarve fra Aaberg Druckfarben, Aaberg, Schweiz, tilsat 10 % polydiisocyanat-hårder. Det er afgørende for transferens holdbarhed, at tonerformstoffet har særdeles god kontakt med den hvide tokomponent-polyurethanelastomer, således at der sker en fælles polymerisation af de to materialer. Da varmfikseringsenheden i kopimaskinen benytter dimethylpolysiloxan-silikoneolie som slipmiddel på varmevalserne, vil små mængder heraf blive overført til tonerlagets overflade og derved nedsætte overfladespændingen. Det var derfor nødvendigt at tilsætte en lille mængde befugtningsmiddel til den hvidtpigmenterede polyurethan-elastomer for at øge dennes befugtningsevne, og der blev tilsat 0,5 % befugtningsmiddel af mærket "BYK 358" fra BYK-Chemie GmbH, Wessel, Tyskland. Bæreaket førtes gennem en tunneltørreovn i 105 °C varm luft til tørring af det hvide lag før videre bearbejdning. Derefter blev der i silketryk påført et transparent tokomponent-polyurethanlag fra samme serie, "Bargoscreen S18/50", som det hvide lag, og mens det var vådt blev det påført et lag "hot melt" copolyamidgranulat af mærket "Kiwomelt 2095 F" fra Kissel & Wolf GmbH, Wiesloch, Tyskland, som udgjorde limlaget. Den færdige transfer blev påsat et bomuld/polyester-tekstil ved 165 °C under

et tryk på 310 kPa i 10 sekunder. Denne type transfer er meget alsidig og egner sig til de fleste typer tekstiler.

## EKSEMPEL 2

5 På et bæreak (1) bestående af et 105 g/m<sup>2</sup> papir (2), belagt med et sliplag af silicone (3), blev et transparent elastomerlag (4) af en lineær énkomponent-polyurethan på basis af polyester og alifatisk diisocyanat påtrykt i en  
10 ønsket konfiguration ved silketryk med en 34T dug. Derefter blev bæreaket med det påtrykte elastomerlag indført i en Ricoh farvekopimaskine af typen NC5006, og et firefarvet mønster (5) af en tokomponent-toner med en partikelstørrelse på 6,4 µm blev overført indenfor området af elastomerlaget (4).  
15 Oven på tonerlaget blev der trykt et transparent elastomerlag (6) på basis af den førnævnte énkomponent-polyesterurethan med samme konfiguration som det første elastomerlag. Videre, blev der trykt et titandioxidpigmenteret hvidt polyurethanlag (7) af samme konstruktion  
20 som de foregående lag. Endelig påtrykkes et limlag (8) bestående af en blanding af en 35% opløsning i dimethylformamid/toluen/methylethylketon af en énkomponent-polyurethanlim på basis af polyester og aromatisk diisocyanat med et blødgøringspunkt på 150-160 °C og et ikke-opløst "hot melt"-pulver på copolyamidbasis. De enkelte elastomerlag  
25 var i dette eksempel indstillet forholdsvis blødt, nemlig med en brud/stræk-grænse på ca 700-800%. Mellem trykningen af de enkelte lag, elastomerlag, hvidt dæklag og limlag, tørres disse i en varmluft/infrarød tørreovn ved 70-80 °C, og transferen er herefter tør, mens den endelige udhærdning  
30 først er tilendebragt efter ca. 10 timer ved stuetemperatur, eller 3-4 timer i varmeskab på 60 °C. Den færdige transfer blev overført til et bomuld/polyester-tekstil ved 180 °C og et tryk på 310 kPa i 10 sekunder. Denne type

transfer egner sig specielt godt til texturede elastiske tekstiler.

### EKSEMPEL 3

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Som i det foregående eksempel, blev der på et bæreark (1) og på den beskrevne måde successivt trykt elastomerlag (4), tonerlag (5), elastomerlag (6), hvidt dæklag (7) og til sidst et limlag (8). Denne gang blev der benyttet en noget  
10 hårdere indstillet polyurethan, nemlig med en brud/strækgrænse på 100-200%. Den pulverformede hot melt var her ligeledes den samme som nævnt ovenfor. Transferen overføres til tekstilet på samme måde som i eksempel 1. En sådan indstilling egner sig især til ikke-elastiske vævede tekstiler  
15 til arbejdstøj.

Sammenfattende, kan det beskrevne transfermateriale, alt efter anvendelsesområde, afpasses til forskellige tekstiler, idet de forskellige elastomerlag kan indstilles blødt  
20 eller hårdt og dermed påvirke elasticiteten og modstandskraften over for temperaturer og mekaniske forhold.

Selvfølgelig er det indenfor opfindelsens rammer muligt at modificere og variere produktet ifølge opfindelsen. Således  
25 kan man f.eks. benytte en silicone-belagt plastfolie i stedet for papir som bæreark. Videre er det også muligt at udelade det hvide dæklag, hvis transferen kun anvendes på hvide tekstiler og påtrykke et transparent elastomerlag på farvetonerlaget og derefter limlaget. Man kan også vælge,  
30 mens det hvide dæklag (7) eller det sidste transparente elastomerlag (6) stadig er vådt, at påføre dette et lag af "hot melt"-pulver, som nedsmeltes i elastomeren i en infrarød/varmluft tørreovn. Denne metode sparer en trykkearbejdsgang, men transferen fremstår noget hårdere på tekstilet.  
35 Endelig kan man trykke det hvide dæklag direkte på to-

nerne og dermed undvære det ene elastomerlag. Denne variation kan dog kun benyttes, hvor det drejer sig om et tekstil med en meget jævn ustruktureret overflade, da den hvide elastomer ellers vil trække tonerne fra hinanden under applikationen og derved skabe et mere uskarpt billede.

## PATENTKRAV

1. Transfer, som under varme og tryk kan overføre én- eller flerfarvede mønstre til tekstiler, **kendetegnet** ved, at den omfatter et bæreak (1) med en ikke-bindende overflade, som bærer
- 5 (a) et én- eller flerfarvet mønster (5) trykt på bæreaket under anvendelse af en digitalstyret farveprinter;
- 10 (b) et transparent (6) eller hvidtpigmenteret (7) elastomerlag af en polymer med højt blødgøringspunkt trykt konfiguratativt på mønstret (5); og
- (c) et varmeaktiverbart termoplastisk polymert limlag (8) trykt konfiguratativt på det transparente (6) eller
- 15 hvidtpigmenterede (7) elastomerlag, eller et varmeaktiverbart "hot melt granulat" drysset på elastomerlaget, mens dette endnu var vådt.
2. Transfer, som under varme og tryk kan overføre én- eller flerfarvede mønstre til tekstiler, **kendetegnet** ved, at den omfatter et bæreak (1) med en ikke-bindende overflade, som bærer
- 20 (a) et første transparent elastomerlag (4) af en polymer med højt blødgøringspunkt trykt konfiguratativt på bæreaket (1);
- 25 (b) et én- eller flerfarvet mønster (5) trykt på det første elastomerlag (4) under anvendelse af en digitalstyret farveprinter;
- (c) et andet transparent (6) eller hvidtpigmenteret (7)
- 30 elastomerlag af en polymer med højt blødgøringspunkt trykt konfiguratativt på mønstret (5); og
- (d) et varmeaktiverbart termoplastisk polymert limlag (8) trykt konfiguratativt på det transparente (6) eller hvidtpigmenterede (7) elastomerlag, eller et varmeak-



tiverbart "hot melt granulat" drysset på elastomerlaget, mens dette endnu var vådt.

3. Transfer, som under varme og tryk kan overføre én- eller flerfarvede mønstre til tekstiler, **kendetegnet** ved, at den omfatter et bæreak (1) med en ikke-bindende overflade, som bærer
- (a) et første transparent elastomerlag (4) af en polymer med højt blødgøringspunkt trykt konfiguratv på bæreaket;
  - (b) et én- eller flerfarvet mønster (5) trykt på elastomerlaget (4) under anvendelse af en digitalstyret farveprinter;
  - (c) et andet transparent elastomerlag (6) af en polymer med højt blødgøringspunkt trykt konfiguratv på mønstret (5);
  - (d) et hvidtpigmenteret elastomerlag (7) af en polymer med højt blødgøringspunkt trykt konfiguratv på det andet transparente elastomerlag (6); og
  - (e) et varmeaktiverbart termoplastisk polymert limlag (8) trykt konfiguratv på det hvide elastomerlag (7), eller et varmeaktiverbart "hot melt granulat" drysset på elastomerlaget, mens dette endnu var vådt.
4. Transfer ifølge et hvilket som helst af kravene 1-3, **kendetegnet** ved, at bæreaket (1) består af papir eller en varmebestandig plastfolie belagt med et tyndt lag af silicone eller polyolefin.
5. Transfer ifølge et hvilket som helst af kravene 1-3, **kendetegnet** ved, at bæreaket (1) er en polyolefinfolie.
6. Transfer ifølge krav 5, **kendetegnet** ved, at polyolefinfolien består af højdensitets polypropylen.

7. Transfer ifølge et hvilket som helst af kravene 1-6, **kendetegnet** ved, at de transparente elastomerlag (4) og/eller (6) består af en elastomer polyurethan med højt blødgøringspunkt påtrykt i form af en opløsning i et organisk opløsningsmiddel.

8. Transfer ifølge et hvilket som helst af kravene 1-7, **kendetegnet** ved, at det hvide elastomerlag (7) består af en elastomer polyurethan med højt blødgøringspunkt, som er pigmenteret med et hvidt uorganisk pigment, påtrykt i form af en opløsning i et organisk opløsningsmiddel.

9. Transfer ifølge et hvilket som helst af kravene 1-6, **kendetegnet** ved, at de transparente elastomerlag (4) og/eller (6) består af en elastomer polyurethan med højt blødgøringspunkt påtrykt i form af en vandig opløsning.

10. Transfer ifølge et hvilket som helst af kravene 1-6 og 9, **kendetegnet** ved, at det hvide elastomerlag (7) består af en elastomer polyurethan med højt blødgøringspunkt, som er pigmenteret med et hvidt uorganisk pigment, påtrykt i form af en vandig opløsning.

11. Transfer ifølge et hvilket som helst af kravene 1-10, **kendetegnet** ved, at limlaget (8) består af en polyurethan-termoplast med et blødgøringspunkt i området 120-160 °C indeholdende dispergerede fine partikler af en "hot melt" af copolyamid- eller højdensitets polyethylen-type med et smeltepunkt på 100-140 °C i forholdet 1:1, påtrykt i form af en opløsning af polyurethanen i et organisk opløsningsmiddel med dispergeret "hot melt"-pulver.

12. Transfer ifølge et hvilket som helst af kravene 1-10, **kendetegnet** ved, at limlaget (8) består af en polyurethan-termoplast med et blødgøringspunkt i området 120-160

°C indeholdende dispergerede fine partikler af en "hot melt" af copolyamid- eller højdensitets polyethylen-type med et smeltepunkt på 100-140 °C i forholdet 1:1, påtrykt i form af en vandig opløsning af polyurethanen med dispergeret "hot melt"-pulver.

13. Transfer ifølge et hvilket som helst af kravene 1-12, **kendetegnet** ved, at de transparente elastomerlag (4) og/eller (6), det hvide elastomerlag (7) og limlaget (8) er trykt på bæreaket (1) ved silketryksprocesser i samme registrering og konfiguration oven på hverandre.

14. Transfer ifølge et hvilket som helst af kravene 1-13, **kendetegnet** ved, at det farvede mønster (5) er trykt på bæreaket (1) eller det første transparente elastomerlag (4) ved hjælp af en tør elektrostatisk farvetoner-printer, en ink-jet-printer med flydende farvestof eller en termotransfer-farveprinter, der alle er digitalstyret.

15. Fremgangsmåde til fremstilling af en transfer, som under varme og tryk kan overføre én- eller flerfarvede mønstre til tekstiler, **kendetegnet** ved, at man på et bæreak (1) med en ikke-bindende overflade

- (a) trykker et én- eller flerfarvet mønster (5) under anvendelse af en digitalstyret farveprinter;
- (b) oven på mønstret (5) konfigurativt trykker et transparent (6) eller hvidtpigmenteret (7) elastomerlag af en polymer med højt blødgøringspunkt; og
- (c) oven på det transparente (6) eller hvidtpigmenterede (7) elastomerlag konfigurativt trykker et varmeaktiverbart termoplastisk polymert limlag (8) eller, mens elastomerlaget endnu er vådt, drysser et varmeaktiverbart "hot melt granulat" på dette.

16. Fremgangsmåde til fremstilling af en transfer, som under varme og tryk kan overføre én- eller flerfarvede mønstre til tekstiler, **kendetegnet** ved, at man på et bæreark (1) med en ikke-bindende overflade
- 5 (a) konfigurativt trykker et første transparent elastomerlag (4) af en polymer med højt blødgøringspunkt;
- (b) oven på det første elastomerlag (4) trykker et én- eller flerfarvet mønster (5) under anvendelse af en digitalstyret farveprinter;
- 10 (c) oven på mønstret (5) konfigurativt trykker et andet transparent (6) eller hvidtpigmenteret (7) elastomerlag af en polymer med højt blødgøringspunkt; og
- (d) oven på det transparente (6) eller hvidtpigmenterede (7) elastomerlag konfigurativt trykker et varmeaktiverbart termoplastisk polymert limlag (8) eller, mens elastomerlaget endnu er vådt, drysser et varmeaktiverbart
- 15 "hot melt granulat" på dette.
17. Fremgangsmåde til fremstilling af en transfer, som under varme og tryk kan overføre én- eller flerfarvede mønstre til tekstiler, **kendetegnet** ved, at man på et bæreark (1) med en ikke-bindende overflade
- 20 (a) konfigurativt trykker et første transparent elastomerlag (4) af en polymer med højt blødgøringspunkt;
- 25 (b) oven på det første elastomerlag (4) trykker et én- eller flerfarvet mønster (5) under anvendelse af en digitalstyret farveprinter;
- (c) oven på mønstret (5) konfigurativt trykker et andet transparent elastomerlag (6) af en polymer med højt
- 30 blødgøringspunkt;
- (d) oven på det andet elastomerlag (6) konfigurativt trykker et hvidtpigmenteret elastomerlag (7) af en polymer med højt blødgøringspunkt; og
- (e) oven på det hvidtpigmenterede elastomerlag (7) konfigurativt trykker et varmeaktiverbart termoplastisk poly-
- 35

mert limlag (8) eller, mens elastomerlaget endnu er vådt, drysser et varmeaktiverbart "hot melt granulat" på dette.

- 5 18. Fremgangsmåde ifølge et hvilket som helst af kravene 15-17, **kendetegnet** ved, at de transparente elastomerlag (4) og/eller (6) påtrykkes i form af en organisk opløsning af en elastomer polyurethan med højt blødgøringspunkt.
- 10 19. Fremgangsmåde ifølge et hvilket som helst af kravene 15-18, **kendetegnet** ved, at det hvide elastomerlag (7) påtrykkes i form af en organisk opløsning af en elastomer polyurethan med højt blødgøringspunkt, som er pigmenteret
- 15 med et hvidt uorganisk pigment.
- 20 20. Fremgangsmåde ifølge et hvilket som helst af kravene 15-17, **kendetegnet** ved, at de transparente elastomerlag (4) og/eller (6) påtrykkes i form af en vandig opløsning af en elastomer polyurethan med højt blødgøringspunkt.
- 25 21. Fremgangsmåde ifølge et hvilket som helst af kravene 15-17 og 20, **kendetegnet** ved, at det hvide elastomerlag (7) påtrykkes i form af en vandig opløsning af en elastomer polyurethan med højt blødgøringspunkt, som er pigmenteret med et hvidt uorganisk pigment.
- 30 22. Fremgangsmåde ifølge et hvilket som helst af kravene 15-21, **kendetegnet** ved, at limlaget (8) påføres i form af en organisk opløsning af en polyurethan-termoplast med et blødgøringspunkt i området 120-160 °C, hvori der er dispergeret et fint "hot melt"-pulver af copolyamid- eller højdensitets polyethylen-type med et smeltepunkt på 100-140 °C i forholdet 1:1.

23. Fremgangsmåde ifølge et hvilket som helst af kravene 15-21, **kendetegnet** ved, at limlaget (8) påføres i form af en vandig opløsning af en polyurethan-termoplast med et blødgøringspunkt i området 120-160 °C, hvori der er dispergeret et fint "hot melt"-pulver af copolyamid- eller højdensitets polyethylen-type med et smeltepunkt på 100-140 °C i forholdet 1:1.
24. Fremgangsmåde ifølge et hvilket som helst af kravene 15-23, **kendetegnet** ved, at de transparente elastomerlag (4) og/eller (6), det hvide elastomerlag (7) og limlaget (8) trykkes på bæreaket (1) ved silketryksprocesser i samme registrering og konfiguration oven på hverandre.
25. Fremgangsmåde ifølge et hvilket som helst af kravene 15-24, **kendetegnet** ved, at det farvede mønster (5) trykkes på bæreaket (1) eller det første transparente elastomerlag (4) ved hjælp af en tør elektrostatiske farvestof- eller en termotransfer-farveprinter, der alle er digitalstyret.
26. Tekstilprodukt, på hvilket der er fasthæftet et én- eller flerfarvet mønster ved overførsel fra en transfer ifølge et hvilket som helst af kravene 1-14.

**SAMMENDRAG**

- En transfer, som under varme og tryk kan overføre én- eller flerfarvede mønstre til tekstiler, omfatter et bærear-  
5 ark (1) med en ikke-bindende overflade, som bærer
- (a) et én- eller flerfarvet mønster (5) trykt på bærear-  
ket under anvendelse af en digitalstyret farveprinter;
  - (b) et transparent (6) eller hvidtpigmenteret (7) elastomerlag af en polymer med højt blødgøringspunkt trykt  
10 konfigurativt på mønstret (5); og
  - (c) et varmeaktiverbart termoplastisk polymert limlag (8)  
trykt konfigurativt på det transparente (6) eller  
hvidtpigmenterede (7) elastomerlag eller et varmeaktiverbart "hot melt granulat" drysset på elastomerla-  
15 get, mens dette endnu var vådt.
- En endnu bedre indkapsling af det farvede mønster opnås ved, at bærearket er påtrykt et første transparent elastomerlag af en polymer med højt blødgøringspunkt, og mønstret er trykt på dette elastomerlag under anvendelse af en  
20 digitalstyret farveprinter. Yderligere styrke opnås ved, at der oven på det farvede mønster er påtrykt både et transparent og et hvidtpigmenteret elastomerlag.

1/1

